	BHARAT HEAVY ELECTRICALS LIMITED A Government of India Undertaking High Pressure Boiler Plant, Tiruchirappalli 620 014, INDIA	Vendor Document No.	Rev.	Page
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SPECIFICATION FOR DIESEL FIRING SYSTEM SKIDS

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie

Requisition Number:		319000-00420-PO-0150-0003		Stamp	
Purchase Order Number:		319000-00420-PO-0150-0003-0006			
Equipment / Item Tag:		----			
Equipment / Item Description:		**SPECIFICATION FOR DIESEL FIRING SYSTEM SKIDS**			
HT Document Number:		'-			
Document Category:		Information		Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.	
OB	1.05.2009	P.A.K	T.K.R	P.V.R	
OA	12.12.2008	P.A.K	T.K.R	V.D	
Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status

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DIESEL FIRING SYSTEM SKIDS

1. AIM, RANGE OF VALIDITY

This Technical Specification defines the minimum requirements with respect to calculation, design, manufacture and performance of the specified supply and services. In case that information, data, etc given in this technical specification and the corresponding attachments should contradict, those definitions and data are valid which grant the higher standards or the better rights to the Orderer.

Deviations from this Technical Specification have to be announced to the Orderer by the Contractor/Bidder in writing.

The orderer reserves the right, to decide the version to be executed.

The Contractor/Bidder is free to propose alternatives to the specified supply and services. However the supply shall be as approved by Orderer.

2. BRIEF DESCRIPTION OF THE PROJECT

The plant is a 2 x 135 MW_e Circulating Fluidized Bed Combustion plant, producing 409.1 t/h each of superheated steam for production of electricity. This plant is located in New Caledonia, situated in the South Pacific Ocean, 1500 km east of Australia. New Caledonia is an overseas territory of France. Site has an design ambient temperature of 33.9^{o} C.

The CFBC boilers are designed to burn coal.

The core of the plant is the combustor where the fuel is burned in a fluidized bed. The bed material is circulating, with solids constantly being carried out with the flue gas,

separated by cyclones and re-circulated to the combustor via seal pot. In order to control the temperature in the combustor a separate stream of bed material is directed to Fluidized Bed Heat Exchanger, cooled and re - circulated to the combustor.

3. TECHNICAL DESCRIPTION

Burners and lances are used for supplementary firing at times when heat input by main fuel is not in operation or not sufficient to maintain the necessary temperature and flow conditions in the combustor.

Fuel oil used for the Start-up Burner and Bed Lances is Diesel.

3.1. START – UP BURNERS

The start up burners are necessary for heating up to the bed material in the combustor until the ignition temperature for the lances or main fuel is reached They may also be used for supplementary firing. They can be employed separately as well as in combination with the lances

They are located in the lower part of the inclined walls of the combustor with both of them opposing each other.

Ignition of the start up burners is carried out by gas igniters with IFM and is checked by individual flame scanners with fail safe logic.

3.2. LANCES

The lances are necessary for further heating of the bed material in the circulating fluidized bed to reach the ignition temperature for coal firing. They are also employed for support firing during technical failures, e.g complete or partial outage of the coal supply. Six Lances are located in the inclined walls. Lances have neither ignition nor flame monitoring systems.

4. RULES, REGULATIONS, STANDARDS

Design shall comply with all the relevant French and New Caledonian statutory and regulatory requirements.

It is the Contractor's responsibility to observe and strictly comply with all relevant mandatory rules (laws, regulations, codes,) issued by international authorities as well as local authorities of the countries involved (country of Orderer, country of Contractor, Country of manufacturing, Country of installation)

In addition to any mandatory regulations the Contractor shall also comply with applicable standards, recommendations and guidelines of major organizations depicted in the Doc. Nos. 319000-00000-JSD-1500-0008/Rev05 and 319000-00000-JSD-1500-0009/Rev05 and the project specifications furnished.

- NFPA Standards (U.S) – National Fire Protection Association
- TRD rules
- Alphanumerical tagging system of plants and devices of the power plant according to our P&ID numbering.
- ISO 3740/3741/3743/3744: Acoustics – Determination of sound power levels of noise sources (using sound pressure)
- DIN – EN 267: Automatic forced draught burners for liquid fuels

Relevant / applicable clauses of the following shall also be complied with :

a) Diesel properties, Doc No. 319000-00000-NM-0002-0002/00 (Page-10)
b) Junction Boxes and Cable glands,
Doc No.319000-00000-JSS-1570-0101/0A (Pages 9/14-14/14)
c) Noise level criteria, Doc No. 319000-00000-SP-6000-0001/0A
d) Noise data, Doc No. 319000-00371-DS-4110-0002/00
e) Name Plates, Doc No.319000-00000-SP-G349-0002/00(Page nos. 3/5-5/5)
f) Painting, 319000-00420-A0106-015-0003-4101/0B (Page nos. 1/7, 4/7)
g) Packing material specn, Doc No. ISPM No-15
h) Packing procedure, Doc No. 319000-00000-WI-GPCO-0001/04
i) Documentation requirement, Doc No. 319000-00000-PP-GPES-0025/01
j) Spare parts requirement, Doc No. 319000-00000-PP-GPCO-0108/05

Contractor's responsibility includes especially, but is not limited to, all rules regarding health and safety, fire and explosion protection and environmental protection.

In the event of any conflict between two relevant rules or a relevant rule and the requirements stated in this specification, the more stringent requirement shall govern.

It is the Contractor's responsibility to obtain the latest, valid issue of each applicable rule. In the event of a dispute over any rule, the Contractor shall provide the Orderer with a copy of the respective rule.

Nothing in this specification shall be construed to relieve the Contractor of his responsibilities. If anything stated in this specification is in conflict with any applicable rule the Contractor shall point this out to the Orderer and ask for clarification.

SI units shall be used for technical data throughout all documents.

5. SCOPE OF SUPPLY

Each of the following scope of items shall be delivered as a skid units fully mounted, checked with functional and pressure tests and flushed. Each skid shall contain all the valves & accessories along with pipings & tubings, as per the respective P&ID. Tag Nos. shall be finalized during approval of the Skid GA drawings.

Skids shall be compact and equipment layout is so as to provide access to the valves and accessories.

The system specific tag numbers shown in the PIDs furnished shall be applied for identification and labeling of components throughout all documents.

5.1 TECHNICAL REQUIREMENTS

5.1.1 DESIGN

All valves, Instrumentation & Control equipment and piping within the valves or control valves and at the burners/lances respectively are to be done according to DIN. The following is to be considered at the battery limits.

- Scope of supply shall terminate with companion flanges, gaskets and suitable fasteners ; open ends are to be firmly capped.
- Flexible hoses with threaded companion connectors shall be supplied.

- Hoses with flanged connection, are to be delivered with counter flanges, gaskets and suitable fasteners.

All components and the corresponding supports are to be designed so that they withstand the following loads:

- Weight of the equipment including internal and external attachments.
- Forces due to thermal expansion and inner pressure
- Cyclic loads.
- Loads due to wind
- Combinations of loads

5.1.2 MATERIALS

- The use of grey cast iron is not allowed
- Minimum is GGG – 40 or high order materials
- Pipelines for instrument air are to be made from stainless steel
- The material that was allowed by the Orderer in case of assignment, is not allowed to be changed without permission by the Orderer. This also applies to the use of a higher grade.

5.1.3 VALVES

The choice of valves is done by manufacturer standard. All valves must comply with the applicable international standards.

5.1.4 ELECTRICAL, C&I EQUIPMENT

The requirements for all electrical equipment, like motors and I&C equipment, is described in the attached specifications.

5.1.5 PAINTING :

The requirements for Painting and Coating, including color code, shall be in line with the specifications and requirements furnished in the purchase enquiry

5.1.6 SPECIAL REQUIREMENTS :

a) Commissioning Spares :

List of commissioning spares and O & M spares with price break - up to be furnished in the offer itself.

b) CE Marking :

Equipment shall carry the CE mark to signify conformity to the European directives, as per the 'Council of the European Communities' Directive.

Supplier is responsible for conformity of the equipment to CE marking and the CE marking in the equipments/components supplied.

c) PED Requirements :

Fabrication/marking of skids/components shall meet the requirement of 97/23/EC Pressure Equipment Directive (PED).

d) General Reference Subject of Directive, but not limited to :

- 73/23/EEC and 93/68/EEC Low Voltage Equipment Directive and Amendment
- 89/336/EEC Electromagnetic Compatibility
- 94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres
- 1999/5/EC Radio and Telecommunications Terminal Equipment
- 97/23/EC Pressure Equipment Directive (PED)
- 98/37/EC Machine Safety.

5.1.7 SERVICES

ENGINEERING

Included in the order are all necessary basic and detail engineering activities required for the design and manufacturing of the supplied equipment, including, but not limited to :

- Design calculations and preparation of data sheets
- Preparation of drawings (arrangement, sectionals, details, workshop drawings)

- Obtaining all necessary approvals and certificates from the authorities.
- Preparation of technical layouts and plans.
- Preparation of lists and schedules
- Preparation of documentation, descriptions and manuals.
- Further more included are all necessary consultation with the Orderer, his client or the client's consultants and authorities from start of contract till end of warranty period.

5.1.8. QUALITY MANAGEMENT, INSPECTIONS & TESTING

All necessary quality assurance measures, as described in section 6 of this specification, especially all necessary inspections and tests, as per section 6.3 of this specification, are included in the scope of services

5.1.9. PACKING & TRANSPORT

Packing and packing material shall be as per the specifications noted in the purchase enquiry. Skids and other loose items shall be transported suitably to New Caledonia Koniambo site. Reference shall also be made to section 8.0 of this specification

5.1.10 ERECTION & COMMISSIONING

Erection and Commissioning is not part of the scope of services, it will be carried out by a qualified contractor of the Orderer or his client. However:

The design and arrangement of components and equipment shall be done in such a way that the erection and commissioning can be done by third parties.

A detailed erection / commissioning manual of the complete scope has to be provided by the Subcontractor. This manual must be so detailed that the erection and commissioning can be evaluated by the contractor and be executed by third companies.

The manual has to consider the following main items:

- Data of scope of erection (components, dimensions, weights etc.)
- Description of all parts to be assembled and installed with reference to place and identification via labels and reference to drawings.
- All activities, their sequence and duration, with required man power, detailed assembling description for all components to be assembled at site.
- Auxiliary means for the erection, necessary devices and tools (lifting equipment, fixing tools etc), required machinery (welding machines etc), tools, test equipment, concept for crane and lifting devices

This information shall be based on drawings with additional text information and verbal descriptions. The complete handling of all parts delivered to site, the requirements as tolerances, site adjustment etc., shall be clearly stated.

Based on the erection and commissioning concept the subcontractor has to generate a time schedule showing all activities for preparing the workshop drawings, all main site activities, devices, shop works, applications, tests etc. In order to optimize the erection

activities, battery limits insulation works, steel works, duct works, e/c work etc. shall be considered. All links to other erection and commissioning activities, components shall be investigated.

5.1.11 The following items shall be provided as optional scope of services:

- Supervision of erection and commissioning, especially alignment and final checks.
- Training of operation and maintenance staff, according to the Contractors O&M manuals.
- Trouble shooting service personnel for support in case of problems (reaction time max 7 days from day of activation until arrival on site)

6. QUALITY MANAGEMENT

The Contractor has to execute a suitable Quality Management System according to the recommendations of DIN/ISO 9000. etc. This also applies for sub suppliers of the

Contractor. These have to present quality certificates for manufacturing and qualification of employees. Contractor and sub supplies are obliged to define quality management (QM) elements in a provable way.

As evidence serve beside the QM-Manual additional regulations for determining internal procedures and execution of quality issues. The Contractor has to make sure that for quality related activities only personnel with respective skills and experience are assigned.

The Contractor has to present to the Orderer on demand in which way the skills have been achieved and how these have been maintained.

The Orderer reserves the right to check the control activities or the respective documentation of executed activities specified in QM-Programs and for quality control plans of the Contractor. For this reason the Orderer is granted free access to workshops of the Contractor or sub suppliers of the Contractor during manufacturing and erection phases.

6.1. QUALITY SUPERVISION

The Contractor has to specify the volume of quality supervision in a quality control plan according to the master plan furnished.

The minimum requirements of the Orderer, specified in the master plan, have to be observed.

The Contractor has to inform the Orderer about deviations with respect to the manufacturing or erection documentation or about defective products and propose a procedure to make good these deviations or defective products.

In addition the Contractor has to mark the product as “defective” and stop further work at the product or it’s use in further manufacturing and erection steps, until a decision about the further progressing has been made.

If a deficiency can be cured by corrective works, the Contractor is responsible for the identification, the execution, supervision and documentation of the correction works.

If the product can't be cured by corrective works, the Orderer has to be informed by the Contractor by a deficiency report and to be involved into the decision of further progressing.

The Contractor presents the quality control plans for all relevant components with the agreement of the Orderer. This Quality Control Plan defines the volume of quality

checks during manufacturing and erection (general qualification certificates of workshop, checks on received material, welding supervision, quality documentation packing, transport)

If no standard quality control plan has been provided by the Orderer, the Contractor has to present a quality plan (taking into account the attached master plan) at least four weeks before start of manufacturing or two weeks after receiving the order from the Orderer.

The Contractor informs the Orderer in due time about quality inspection dates which allow the Orderer to participate in these inspections. The presence and participation of the Orderer during the inspections does not reduce the Contractor's responsibility and contractual obligations.

The Quality Documentation has to be delivered by the Contractor in accordance with the demands of the attached list "Contractor Documentation".

6.2. QUALITY GUARANTEES

Tests and inspections do not release the manufacturer from his responsibility with regard to warranties and guarantee obligations and with regard to compliance with other provisions.

The basis for the implementation is the drawings approved by the Orderer.

The Orderer or its representative and the Principal reserve the right to monitor the work at any time and to check the technical implementation

Compliance with deadlines must not be affected by tests.

The Contractor must request decisions that are reserved by the Orderer or its representatives in good time so that difficulties or delays in the implementation of the work do not occur

The offer or order price must contain all costs for material, work and construction samples, in so far as tests and sampling are prescribed and carried out. The Orderer shall be responsible for the personal expenses of test engineers from the Orderer / Principal (or their representatives) for the tests and inspections in the Contractor's workshops or on the site. The delivery price must contain the personal expenses for all other test engineers.

6.3. INSPECTIONS & TESTS

Test procedures according to :

- Test plan
- Drawings, documentation, engineering approved by the Orderer
- Relevant rules, standards and guidelines as per section 4

7. TECHNICAL DOCUMENTATION

The technical documentation has to be delivered in accordance with the requirements indicated but not limited to this.

Prior to the start of manufacturing / erecting the workshop drawings / erection drawings or other engineering documents shall be submitted to the Orderer in due time in copies for approval. All the relevant information are to be furnished in the drawings/documents.

It has to be considered that the approval procedure will take at least ten working days.

The Ordered reserves the right to reject improper design and / or request parts from other vendors, provided this will not result in additional costs above a reasonable extent.

Document approval by the Ordered does not release the Contractor from his responsibility of providing a technical design of the deliveries that is in accordance with the contractual stipulations, appropriate for the requirements and free from deficiencies.

8. PACKING AND TRANSPORTATION

Unless stated otherwise in the commercial contract conditions the following requirements apply to packing and transportation:

- All assemblies and loose equipment shall be transported to the installation site.
- The Subcontractor is obliged to preassemble as much of his deliveries in the workshops as possible with respect to shipping dimensions
- All loose sensitive equipment (such as drives, electrical equipment, etc.) have to be protected against damage, vibration, rain, dirt and corrosion, and will be shrink packed on palettes or in containers.
- Smaller loose equipment (fittings, valves, etc) as well as field instruments will be shipped in separate wooden boxes or container boxes.
- Shipping shall only be carried out upon the Borderer's notification and approval.
- Each piece shall be clearly marked and identified. Codes shall also be marked on part list and erection drawing.
- Special requirements apply in case of sea transport.

In addition to these general requirements the shipping instructions, related specifications noted, shall be adhered to.

9. TECHNICAL GUARANTEES

The contractual penalties, guarantee period and the liability for any errors and the resultant costs that arise from this are stipulated on the order form.

The manufacturer shall be responsible for the quality of the work that he carries out. He guarantees that his scope of supplies is correct and complete. The work is carried out in accordance with the state of the art.

The manufacturer shall eliminate defects and faults detected by the Orderer or the authorized expert at no cost to the Principal. After remedy of defects the manufacturer undertakes to notify the Principal for the purpose of a renewed inspection. If defects are detected and complained about they must be eliminated in accordance with the documents appropriate to the contract. Faults and defects that are found shall be eliminated within the contractually agreed delivery period.

In the event of any damage the Contractor must provide proof of the correctness of the material selection, engineering, erection description and other relevant specifications.

Furthermore, the manufacturer guarantees for compliance with the following:

- Construction of the burner system according to relevant standards
- Technical performance data
- Compensation of fluctuations of the heating values within ±10%
- Consumption values for miscellaneous atomizing air and steam amounts
- Pressures drop
- Arbitrary regulation of the Start-up Burners and Lances within the indicated performance range.
- Ignition tests possible during coal firing

10. LIST OF ATTACHMENTS BY CONTRACTOR (but not limited to this list) :

Sl. No.	TITLE	DOCUMENT NO.	ISSUE	REV.	REMARKS
01	Layout/GA drawings				
02	Bill of Material				
03	Contractor Documentation				
04	Quality Inspection Plan				
05	Requirements for Electrical Equipment				
06	Painting and Coating				
07	Ref. Standards & Codes				To be furnished/quoted.

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	Department: : FBC & HRSG / Commercial,Building No.79 **Telephone** : 91–(0431) – 2574109, **Fax** : 91–(0431) – 2520233, **e-Mail** : kuppurajah@bheltry.co.in	**FBC&HRSG:FF:5312:SAF**	**OB**	1 of 6

SPECIFICATION FOR SCANNER AIR FAN WITH AC MOTOR

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie

Requisition Number:	319000-00420-PO-0150-0003	Stamp
Purchase Order Number:	319000-00420-PO-0150-0003-0006	
Equipment / Item Tag:	----	
Equipment / Item Description:	**SPECIFICATION FOR SCANNER AIR FAN WITH AC MOTOR**	
HT Document Number:	319000-00420-B1203-0150-0003-0156	
Document Category:	Information	Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

OB	30-10-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	
OA	25-SEP-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	
Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status

SL. NO	SPECIFICATION	BHEL REQT.	VENDOR CONFIRMATION YES/NO
1.0	SCOPE		
1.1	This technical specification specifies the design, construction and testing requirements of centrifugal fan(Augumenting Air Fan)		
2.0	*APPLICABLE STANDARDS*		
2.1 0B	As per project specification and IS 4894 specifications for centrifugal fan. BS 848 Part I method of testing performance. ISO 1940 balance quality of rotating rigid bodies. In case of any information not specified in this specification, the above specifications will be binding.		
3.0	*DESIGN & CONSTRUCTIONAL REQUREMENTS*		
3.1	Type	Radial back-ward curve blade. Type: Directly coupled to the motor and mounted on a common frame, shall be designed for continuous duty	
3.2	Fan suction	Shall be side axial with air filter and transition piece.	
3.3	Fan discharge	Shall be vertically upward with transition piece.	
3.4	Suction and discharge end	The transition piece shall be less than 300 mm length. The taper angle shall not exceed 15 Dec to give smooth transition. The fan to transition piece joint shall be flanged. The suction and discharge ends shall be provided with flanges, counter flanges and fasteners to match with the pipe sizes specified.	
3.5.1	Motor capacity	Shall be minimum 20% more than BHP	

		required by the fan motor and shall be of reputed make and confirm to the attached motor specification and its QPS	
3.5.2	Starting current	The starting current of the motor shall not exceed the value indicated in the motor.	
3.5.3	Motor starting time	The starting time for the fan assembly to reach the full load current shall not exceed the value indicated in motor specification	
3.6	Fan Impeller	The fan impeller shall be directly mounted on the shaft with the impeller hub keyed to the shaft and axially bolted to motor shaft to prevent axial movement of impeller. The shaft shall be fully enclosed in the impeller hub. The thickness of impeller wall shall not be less than specified in applicable standard	
3.7	Casing	Shall be single construction suitably stiffened for minimum vibrations. Inspection door and drain plug shall be provided. Sufficient clearance shall be given between impeller and suction mouth. A stainless steel flow direction arrow plate shall be fixed permanently on the casing. For the inlet and outlet, the necessary` transition piece, flange/counter flange with fasteners shall be provided.	
3.8.1	Fan Balancing	The static and dynamic balancing tests shall be done as per ISO 1940.The residual unbalance shall be limited to the group C6.3t of ISO1940. the " w x e" shall be less than 6.3 mm/e where e= permissible residual unbalanced and "w" is the angular velocity. The testing shall be made with all the vibration pads mounted under the frame.	
3.8.2	Damping pads	Necessary damping (Anti- vibration pads) shall be provided for the fan and drive mounted on common steel frame. For ground mounting of fan, drive and common frame, necessary foundation bolts, nuts and washers shall be provided.	
3.8.3	Bearing	The bearing shall be provided with facility for greasing	

4.0	**INSPECTION AND TESTING**		
4.1		All fans to be inspected by the purchaser at manufactures works for its constructional and dimensional details. All the tests are to be done by the manufactures and witnessed by purchaser as per approved QP. Vendor to submit manufacturing QP for approval. Third party inspection is applicable.	
4.2		Performance test on one fan in each type as per BS848 part –I or IS 4894/1968. however the tolerance on pressure capacity and power absorbed shall be as per BS 848 part I clause only.	
4.3		The following is the variations permitted when tested at rated pressure. a. Inlet volume of flow -7.5 % b. power input +15%	
4.4	Vibration	Vibration measurement 6mm per sec.(max)	
4.5		Continuous running test for 8 Hrs	
4.6		Starting time	
5.0	Documents shall be supplied in triplicate of the following.		
5.1		Point wise conformation of specification and filled in technical data sheet shall be provided at the time of offer. The final filled in data sheets forms part of purchase order. Deviation if any taken from this specification shall be clearly indicated.	
5.2		Fan operating characteristics	
5.3		Assy .drawing of motor and fan with transition piece, foundation plan/ details and material specifications	
5.4		Test certificates as mentioned under section 4.1 after ordering	
Documents shall be supplied in triplicate of the following after ordering			
5.5		Material test certificates for impeller and shaft	
5.6		Test certificates and characteristics as	

		called for under motor specification	
5.7		Weight of all components	
5.8		Recommended spares, lubricating oil & quantity	
6.0	GUARANTEE	The equipment shall be guaranteed against manufacturing defects. The performance guarantee shall be for a period of 12 months from the date of commissioning or 18 months from the date of delivery of equipment.	
7.0	O&M MANUAL	The erection, operation & maintenance manual with trouble shooting guides should be provided in floppy/CD(2nos) and hard copies (4nos) by the supplier	
8.0	PACKING	The fan motor shall be packed in assembly condition. All components shall be identifiable with packing lists with BHEL material codes mentioned	
8.1		All opening shall be covered with blanks and the total assy. Is to be covered with rain proof sheet to avoid water entry in the motor winding and fan and packed firmly in wooden box. Packing shall be suitable for handling and storage at open yard outdoor.	
10.0	SUPPLIER TO REF. THIS SPECIFICATION(FBC&HRSG: FF: 43: 002)WITH		
10.1		Specification for motor(AC) Document No. 319000-00000-JSS-1696-0001-05	
10.2		Fan data sheet	
10.4		Special Packing Specification if applicable	

11.0 Marking:

11.1 Stainless steel name plate with following information boldly engraved , shall be firmly fixed to the body. Name plate shall be as per Document No. 319000-00000-SP-G349-0002Rev00.

11.2 Each spare shall be individually tagged with part name, maker's name, spare code & BHEL material code and/or as per the instructions provided along with the Purchase Enquiry.

12.0 Painting :

12.1 Painting shall be done in accordance with the Doc No. 319000-00420-A0106-015—0003-4101/0C. 0B

13.0 Packing:

13.1 Packing and packing material shall be as per ISPM No.15.

And reference shall be made to Document No. 319000-00000-WT-GPCO-0001Rev04 for packing.

13.2 Liberal packing material & struts be used to arrest rolling and to prevent from transit damage.

14.0 Documents required with offer:

14.1 Refer Document No. 319000-00000-PP-GPES-0025 Rev02

15.0 CE MARKING & PED REQUIREMENTS :

Equipment shall carry the CE mark to signify conformity to the European directives, as per the Council of the European Communities' Directive and particularly:

73/23/EEC and 93/68/EEC Low Voltage Equipment Directive and Amendment

89/336/EEC Electromagnetic Compatibility

94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres

1999/5/EC Radio and Telecommunications Terminal Equipment

97/23/EC Pressure Equipment Directive (PED)

98/37/EC Machine Safety

The Supplier is responsible for CE Marking and PED conformity.

16.0 O & M MANUAL:

Minimum of 2 sets of O&M manual in hard copy and 2 sets of soft copy shall be furnished within one month from the date of Purchase Order. ***Documents shall be furnished both in ENGLISH and FRENCH languages.***

17.0 Guarantee :

17.1 The equipment shall be guaranteed for replacement of any defective component.

17.2 The performance guarantee shall be for a period of 18 months from the date of commissioning.

Low Voltage Motors

03	13/July/2006	P. Shield	G. Bahuchet	H. Tendijowski	W. Yau	Re-Issued for Implementation
02	13/Jan/2006	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Re-Issued for Implementation
01	13/Jan/2006	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Re-issued for Approval
00	14/Dec/2005	L. Weber	G. Bahuchet	H. Tendijowski	W. Yau	Issued for Implementation
Rev.	Date (dd/mmm/yyyy)	Author (Name)	Checked (Name)	Approved (Name)	Approved (Name)	Status
HT					Owner	

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1. Scope

1.1 General

This Specification describes the minimum requirements for the design, manufacture, supply and delivery of high efficiency, low voltage, three and single phase 50Hz electric motors, complete with all components and ancillary equipment, including all minor items not specifically referred to, but essential for the safe and satisfactory installation, testing, commissioning, operation and maintenance of the motors. The equipment is to be installed by others as part of the Koniambo Nickel Project in New Caledonia.

The scope of supply includes the size, type and quantity of motors listed in the schedule and described in the attached motor design data sheets.

This Specification applies to low voltage motors of all frame sizes including motors which form part of packaged plant or equipment. Any exceptions in regard to specific motor sizes are noted in this Specification.

2. Standards and Codes

All equipment shall comply with the requirements of French and New Caledonian Codes and Standards as well as all laws and regulations of local authorities. Where other Codes and Standards are used, they shall also satisfy the French and New Caledonian requirements. In the event of conflicting requirements between Codes and Standards, the French and New Caledonian requirements shall apply. 03

Motors shall conform with:

NF EN 60034	Rotating electrical machines.
NF EN 60072	Dimensions and output series for rotating electrical machines.
NF EN 60079	Electrical apparatus for explosive gas atmospheres.

All information shall be based on International System (SI) unit of measure. 03

All equipment presenting a risk or leading to a risk regarding the safety of workers have to comply with French Standards, Codes and regulations. This is mandatory by the NC Deliberation No 51/CP dated 10 May 1989, which technical provisions refer to the European Directive 92/104/EEC.

The current edition of the French Codes shall be used for the design of all components of the project as stipulated by the New Caledonian law (Caledonian decree 1348 of 22 November 1985).

When a Notified Body is required to verify the conformity with the French (or IEC codes that have been adopted by the European Union), it shall be the Supplier's responsibility and shall be at Supplier's expense (except when otherwise specified).

The Notified Body that acts as a recognized third party, conversant with French and New Caledonian Codes, shall certify and stamp the certificate of conformity issued and signed by the Supplier or manufacturer.

3. CE Marking

All equipment shall carry the CE Marking (European Conformity), as per the 'Council of the European Communities' Directive.

The Supplier is responsible for CE Marking conformity.

4. Operating Conditions

Details of the site operating conditions are contained in the Site Criteria document, 319000-00000-JSD-GENG-0001. Refer to Project Electrical Design Criteria document, 319000-00000-JSD-1600-0001, for electrical operating conditions. 03

5. Design and Construction

5.1 General

The equipment shall be designed and installed to operate continuously at full load for 24 hours per day, 7 days per week at the extremes of temperature, humidity and environmental conditions indicated. The equipment shall have a design life of 20 years without the need for an excessive maintenance regime. 03

Motors shall be designed for safety, corrosion resistance and ease of access to maintainable components.

Special motor operating conditions (if any) will be individually considered and specified in requirements for those motors. Such conditions include frequent starting, ambient temperature extremes and variable or multi-speed operation.

5.2 Minimum Size for Repair

The Supplier shall nominate and justify a minimum motor size to be repaired based on the locality and the Supplier's capacity to service and support the site. It is intended to replace rather than repair motors below the minimum size for repair.

5.3 Voltage Sizing

Motors voltages will be supplied as follows:

System	Nominal Service Voltage
Motors (DOL) ≤ 6355 & ≥ 0.75 kW	690 V ± 10%, 3 Phase, 50 Hz, 3 Wire, impedance earthed
Motors (VSD or SS) ≤ 1000 & ≥ 0.75 kW	690 V ± 10%, 3 Phase, 50 Hz, 3 Wire, impedance earthed
< 0.75 kW	230 V ± 10%, 1 Phase, 50 Hz, solidly earthed
Service Power	400 / 230 V ± 10%, 3 Phase, 50 Hz, 4 Wire, solidly earthed

5.4 Service Rating

Motors shall be of high efficiency, class EFF1 in accordance with EU/CEMEP.

Motors shall be of Squirrel Cage type. Double cage rotors are unacceptable. The number of motor poles will be specified in the schedule.

Motors shall be designed for continuous running operation at rated power, duty service type S1. Performance and dimensions shall be in accordance with applicable Standards.

Motors shall be capable of withstanding voltage transients caused by switching with vacuum contactors.

5.5 Starting

5.5.1 General

All motors shall be designed and braced for direct on line (DOL) starting, for restarts with full opposite residual voltage under full load conditions.

At any value between 80% and 100% of rated voltage and without exceeding the designed temperature limitations motors shall, as a minimum be capable of the following starting sequence for the prospective equipment load:

- Three successive starts from maximum ambient temperature.
- Two successive starts with the motor already at full load working temperature.

The starting sequence shall be repeatable after a 30 minute cooling period at standstill.

5.5.2 Starting Current

Starting current shall not exceed seven (7) times full load rated current (FLC) of the motor.

5.5.3 Locked Rotor

Motors shall have a permissible locked rotor time of not less than 20 seconds from cold without exceeding the allowable temperature rise. Exact values for safe stall time from hot and cold shall be specified.

5.5.4 Torque

Motors shall be able to withstand 1.6 times rated torque for not less than 15 seconds from cold without exceeding the designed temperature limitations.

Motor torque characteristics shall comply with relevant Standards unless higher torque characteristics are specified.

5.6 Mounting

The motor mounting arrangement will be specified in the schedule.

Where specifically requested the Supplier shall supply slide rails consisting of two cast iron rails designed for floor mounting and complete with adjustment and holding down bolts.

5.7 Fasteners

Metric Standards shall apply.

All fasteners shall be stainless steel with hexagonal or socket heads. Bolts are to be used for fixing the terminal box to the motor.

5.8 Materials

Motor frames, end shields, terminal boxes are to be fabricated from cast iron. Motor fans are to be fabricated from cast iron or steel. Motors below the minimum motor size for repair may have non-metallic fans and sheet metal fan cowls. Plastic, aluminium or aluminium alloy is not to be used.

Materials are to be selected which prevent / resist corrosion.

5.9 Frame

The stator lamination pack shall be secured in the frame. Castings shall be sound and free of shrink holes, cracks, scale or other defects. End shields shall bolt directly to the motor frame.

Motor frame including bearing supports shall have sufficient strength and rigidity to avoid distortion or increased vibration as a result of external mechanical forces.

Three phase motor frames shall be rationalised in accordance with Cenelec HD 231. Motor frames for motors with an output outside of that specified in HD 231 shall be optimised based on the applicable Standards and performance requirements.

5.10 Degree of Protection

Motors shall have a minimum Ingress Protection rating of IP55.

Motors are to be fitted with a breathing vent at the bottom of each end. Motors shall be provided with drain holes, which shall be tapped and fitted with a porous drain plug.

An approved sealing compound of non-setting material shall be used to weatherproof mating machined surfaces.

5.11 Rotation

Preferred direction of rotation is clockwise from the drive end. Motors shall be suitable, without modification, for rotation in both directions.

5.12 Noise

The noise level of the motor is not to exceed 80 dB(A) at 1 metre. This is to also apply for motors operating on a variable speed drive over the entire operating range.

5.13 Bearings and Lubrication

5.13.1 General

All machines shall be fitted with heavy duty bearings. All bearings shall be designed for an L10 life of 50,000 hours.

Bearings shall be of Standard types enabling replacements to be readily available from recognised bearing manufacturers. Bearings shall be in metric sizes.

Bearings shall be selected to suit the motor load and operational requirements. Motor load requirements will be specified in the schedule.

Motors of all sizes shall be equipped with metal caged rolling element bearings. Plastic cage bearings are not acceptable.

Drive end bearings shall be designed for applications producing radial loading (e.g. V-Belt drives). The drive end bearing on flange mounted motors will be to the Supplier's Standard arrangement provided that this design incorporates an oil seal and slinger.

Non drive end bearings shall be secured to the shaft by means of a nut, circlip or other approved means so that the motor can be loaded up to the full axial loading of the bearing.

Shaft end float shall be stated on the nameplate for all motors to enable a check to be made on the end float of the coupling to be supplied with the driven equipment.

All motors shall be fitted with bearing protection from induced currents in the form of a shaft earth or bearing insulation to protect against induced currents.

5.13.2 Requirements for 160 Frame Size And Above

Bearing lubrication system required. This shall comprise a full through flush regreasing facility incorporating a pressure relief value that allows the bearing to be purged whilst in operation with the old grease being automatically exhausted from the motor enclosure.

Adequately sized grease discharge ports shall be provided. The grease discharge port shall be located outside the area enclosed by the mounting flange. The fitting of grease relief holes alone is not acceptable. The removal of a exhaust plate/ plug when regreasing is not acceptable.

Each bearing shall be fitted with a V-ring or Labyrinth seal (depending on speed requirements) to prevent contamination through ingress of lubricants, moisture or fine dust. Seals are to be positioned so as not to be liable to mechanical damage.

Grease nipples shall be readily visible and accessible and shall be of 6mm button head type. For motors fitted with a stainless steel dust shield the grease points shall be extended through the dust shield to allow maintenance access. Captive dust caps shall be provided at all lubricating points.

Lubrication points shall be located on the top of the motor at the drive end and non drive end. These shall be positioned so that they are opposite the exhaust port on the grease relief valve. The Location of grease nipples shall be clearly shown in equipment maintenance manuals.

Drip trays are to be provided for the collection of purged grease.

Oil lubricating systems will be considered where the grease limiting speed of the bearing is exceeded.

5.14 Windings and Insulation

Windings shall be of high quality copper alloy capable of withstanding 1.2 times the maximum rated speed undamaged.

Winding insulation shall be Class F with Class B temperature rise. Winding insulation of motors to be used with variable speed drives shall be Class H with Class B temperature rise.

The winding insulation of motors to be used with variable speed drives shall be reinforced to withstand the output voltage of modern VSD's. The variable speed drive Supplier will be advised by the Owner. The low voltage motor Supplier shall consult with the variable speed drive Supplier to ensure the motors and VSD's are compatible.

Tropic proofing shall be applied.

The windings shall have their six (6) leads accessible in the terminal box to allow star or delta coupling. Two speed motors shall have separate windings.

5.15 Temperature Sensors

Alarm and trip thermistors shall be fitted as Standard to DOL motors 55kW and above. Alarm and trip thermistors or RTD's shall be fitted as standard to all variable speed drive motors.

Temperature sensors are to be embedded in the hottest part of each winding.

Temperature sensor leads shall be colour coded and identified by the temperature rating. The Supplier shall specify alarm and trip temperatures for the temperature sensors.

5.16 Cooling

DOL motor enclosures shall be of the totally enclosed fan cooled type (TEFC) to IC411.

Variable speed drive motors shall be of the totally enclosed fan cooled type (TEFC) to IC411 or IC416 (where required).

Shaft driven and auxiliary cooling fans shall be of the bi-directional type and low noise. Motor fan cowl shall be designed so as not to allow insertion of a finger.

5.17 Anti-Condensation Heaters

230 VAC anti-condensation heaters shall be installed in all motor frames 55kW and above. Heater power terminals shall be brought out to a separate terminal box. The heater power supply will be RCD (30mA) protected at the supply point.

Anti-condensation heaters shall be arranged to provide uniform heating of stator and should maintain the temperature of the motor windings approximately 5°C above ambient temperature.

5.18 Dust Shields

As an option, motors with regreasable bearings may require a dust shield. These shields shall be 2mm thick stainless steel and wrap around the motor from one set of mounting feet to the other over the cooling fins. Terminal boxes, grease nipples, lifting lugs etc shall protrude through the dust shield.

5.19 Terminal Boxes

5.19.1 General

Terminal boxes shall be of cast iron and rated at IP55.

A separate terminal box is required for motor power and anti-condensation heaters for motors 55kW and above.

For motors fitted with RTD's a separate terminal box with an M20 entry is required for RTD connections.

5.19.2 Location

Terminal boxes shall be located on the right hand side of the motor when viewed from the drive end.

Terminal box shall be rotatable. It should be possible to change the position of the motor terminal box from right hand side to left hand side and vice versa.

5.19.3 Segregation and Terminals

Power terminal boxes shall be designed for air termination of copper conductors. There shall be adequate space in power terminal boxes to complete an air insulated termination of a three phase low voltage cable after glanding. Oversized terminal boxes shall be provided to accommodate larger cable sizes.

Power terminal boxes shall be equipped with six fixed stud type terminals to accommodate six winding ends. The studs shall be arranged so that the windings can be linked in either star or delta configuration. The links shall be provided by the Supplier.

Thermistors may share the power terminal box on approval, in such cases these shall be mounted on a separate terminal strip.

Terminal blocks, boards and / or bushings shall be of synthetic resin material, porcelain shall not be acceptable.

5.19.4 Gland Plate

Terminal boxes shall be fitted with a removable, metallic, non magnetic gland plate for cable entry to the cable box.

Terminal boxes and gland plates shall be of adequate size to allow for glanding and air termination of the low voltage cables. Gland plates shall be to the ingress protection rating of the terminal box.

Cables shall be bottom entry.

The design intent is to ensure cables can be removed from the motor without damage to cables or flexible conduits.

5.19.4.1 Earthing

An M10 stainless steel bolted earth stud is to be located inside every terminal box complete with nuts and washers.

An additional M10 stainless steel bolted frame earth stud is to be located on the underside of the power terminal box complete with nuts and washers.

5.19.5 Covers

Stainless steel bolts, nuts and spring washers shall be fitted on all terminal box covers. Bolts shall be captive.

Terminal boxes shall be flanged, gasketted and bolted complete with appropriate seals to the specified ingress protection rating.

5.20 Nameplate, Labels and Signage

Nameplates, labels and signage shall be as per the specifications given in the project Equipment Nameplates document 319000-00000-SP-G349-0002_00. In addition, nameplates, labels and signage shall also comply with the requirements set out in the Electrical Installation document 319000-00000-JSS-1601-0002_00. 03

5.21 Surface Preparation and Finish

The Supplier's Standard epoxy painting system shall be offered on the provision that it provides protection against all site conditions and complies with applicable standards, otherwise the painting shall be in accordance with the Protective Coatings document. 03

Parts of the motor normally shielded by the fan cover and the inside of the fan cover shall, with respect to corrosion protection, be treated in a similar manner as normally exposed parts.

The paint colour for motors shall be as follows:

Non-Hazardous Area Motors	Supplier Standard (Internal) / RAL 7001, Grey (External)
Hazardous Area Motors (Zone 1)	Supplier Standard (Internal) / RAL 5002, Blue (External)
Hazardous Area Motors (Zone 2)	Supplier Standard (Internal)/ RAL 1033, Golden Yellow (External)

The Supplier shall advise if there are any significant implications for using the nominated colours as opposed to the Supplier standard colours.

5.22 Vibration Monitoring

All motors with regreasable bearings shall be equipped with at least one Shocked Pulse Measurement (SPM) transducer adaptor at the drive end and non drive end in an accessible position clear of the motor body to suit a bearing condition analyser.

These shall be positioned so as to detect any vibration on the motor frame.

Additional SPM transducer adaptors may be specified for motors with special loading requirements.

5.23 Hazardous Areas

The hazardous area classification of all motors shall be noted in the schedule. Motors noted as located in a hazardous area shall be ATEX certified for the hazardous area classification (e.g. EExn, EExd or EExp).

5.24 Alternative Designs

Alternative designs may be offered for motors below the minimum size for repair, which may be replaced rather than repaired. Deviation to this Specification, if any, shall be submitted with the tender.

6. Testing

All systems shall be tested before shipping and all shall be operating properly at the time of shipping.

The Supplier shall carry out routine tests on all motors. Copies of routine and type test certificates shall be provided in manuals. Routine tests shall include:

- Withstand Voltage Test.
- Winding Insulation Resistance Measurement.
- Winding Resistance Measurement (Ambient).
- Surge Comparison Test.
- No-load Losses and Current Tests.
- Locked Rotor Current Tests.

7. Packaging for Transport

Heavy duty plastic wrapping and sealing of entries with threaded plugs as a minimum. Exposed shafts shall be wrapped with a protective tape to prevent surface deterioration.

A shaft locking clamp to prevent drive end bearing damage by "Brinelling" during transport shall be fitted prior to shipment. A shaft key shall be supplied with the motor. Shaft locks shall prevent the longitudinal movement and the rotational movement of the rotor and shall be easily removable when the motor is installed. All motors fitted with a shaft lock shall have adequate warning notices displayed in a prominent position on the motor frame.

Motors shall be fitted with lifting lugs or eye bolts to the weight of the motor. Removal of the lifting facilities shall not compromise the degree of protection of the motor. All lifting points are to be clearly identified.

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)

Motors shall conform to French Standards. High efficiency energy saving motors are required. All bolts and screws shall be corrosion resistant stainless steel. Only stainless steel shall be used for dust shields or shims etc.
Motors shall be suitable for exposed outdoor use to 40C ambient in a tropical environment that may be dusty, wet, corrosive and subject to spillage of nickel ore, rock, salt water spray, coal or corrosive fluids.
Motors shall preferably be 4-pole foot mounted. However motors of up to 8 poles may be used for Economic or maintenance reasons. Preferred direction of rotation is clockwise from the drive end.
Preferred location of the rotatable terminal box is RHS viewed from the drive end or else top mounted.
All motors shall be provided with stainless plates (in addition to the standard nameplate) engraved with the motor number. These plates shall be attached with stainless steel wire so that the plates can be transferred to replacement motors.
All motors shall be able to start and accelerate connected loads when the voltage at the point of load is 80% of the nominal voltage.

LV Motors

These shall be rated up to 355kW and up to 1000kW if equipped with VSD unit unless otherwise specified and shall be provided with the following features:

- Conform to the relevant standard including frame sizes.
- Cast iron frame, fan cooled.
- Squirrel cage motor, duty type S1 (continuous).
- 690V +10% -6% (steady state), -10% during the starting period of other motor, 3 phase 50 Hz with Variations as noted in clause 'frequency Variation".

The system frequency variations are as follows:

- Steady State 50 Hz ±2%. (1Hz)
- Short term (1 minute) limit 50 Hz ±4%.
- Brief emergency excursion limit (10 seconds) to 54Hz following a major load rejection or 47Hz following a major load application.
- Enclosed frame, IP55, TEFC.
- Stainless steel dust shield wrapped around motor body between mounting feet (option).
- Bi-directional cooling fan - low noise.
- Noise level below 80 dBA at 1m.
- Motor terminal box IP55, with removable nonmagnetic gland plate or cable entry, RHS viewed from drive end or on top.
- Earth stud in terminal box plus external frame earth stud beneath terminal box.
- Motor terminal box oversized to accommodate specific 3C+E cables or large single core cables per cable schedule.
- Winding insulation Class F, with Class B temperature rise as a minimum.
- Method of cooling IC411.
- Rated for 6 starts per hour as a minimum.
- Grease pressure relief anti friction bearings.
- Bearings chosen to suit load type.
- Bearing lubrication system required.
- Bearing current protection fitted (e.g. shaft earth or bearing insulation).
- 230 V AC heaters fitted 55kW and above (VSDs only).
- Thermistors fitted 55kW and above (VSDs only).

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
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□ Separate junction boxes for power, heaters, and temperature sensors. □ Two pack epoxy paint colored as per section 11, Painting and Identification.
□ Tropic proofed.
□ Rationalized motor sizes to reduce spares.
□ Suitable for use with variable speed controllers or separately driven fan fitted.
□ Motors above 0.75kW to be 3 phase.
□ All bearing housings on motors with reasonable bearing shock pulse movement shall be equipped with SPM transducer adaptors in an accessible position clear of the motor body to suit a bearing condition analyser. Axial, vertical and horizontal SMP studs shall be fitted at DE and NDE.
□ Shipped bolted to a skid frame, wrapped in several layers of heavy duty plastic with shaft clamps fitted and all entries sealed by threaded plugs. Shaft keys shall be taped to the motor shaft.
□ Parallel type drive shafts shall be provided unless required otherwise by the drive application.
□ The sizes of single speed general-purpose three phase motors shall be rationalised in accordance with Cenelec HD 231.

Motor Numbering

In addition to the standard nameplate, all motors shall be provided with a blank 316 stainless steel plates for HT to add their motor number.

Variable Speed Drive Motors

Motors for variable speed drive applications shall be specifically chosen based on the duty and speed range provided on the motor data sheet.
Specific additional requirements for VSD motors are as follows:
□ Class H insulation with class B temperature rise preferred.
□ Bearing current protection fitted (e.g. shaft earth or bearing insulation).
□ Noise within specified limits over speed range specified.
□ Motor temperature sensors fitted (thermistors or RTD) for motors rated 55kW and above.
□ 230V AC heaters fitted for motors rated 55kW and above
□ Separately driven fan or larger frame size motor supplied if standard motor cannot meet service conditions (load and duty over speed range).

	Name	Signature	Date
Prepared	Nitin Menon		26.04.2008
Checked	A.Swaminathan		26.04.2008
Approved	R.J.Narayanan		26.04.2008

	BHARAT HEAVY ELECTRICALS LIMITED A Government of India Undertaking High Pressure Boiler Plant, Tiruchirappalli 620 014, INDIA	Vendor Document No.	Rev.	Page
	Department: : FBC & HRSG / Commercial,Building No.79 **Telephone** : 91–(0431) – 2574109, **Fax** : 91–(0431) – 2520233, **e-Mail** : kuppurajah@bheltry.co.in	**FBC&HRSG:FF:5312:TV**	**0B**	1 of 5

SPECIFICATION FOR DIESELTRIP VALVES

PROJECT : KONIAMBO NICKEL PROJECT, NEW CALEDONIA
2X135 MW CFBC BOILER
l'Usine du Nord
Nouvelle-Calédonie

Requisition Number:	319000-00420-PO-0150-0003
Purchase Order Number:	319000-00420-PO-0150-0003-0006
Equipment / Item Tag:	----
Equipment / Item Description:	**SPECIFICATION FOR DIESEL TRIP VALVES**
HT Document Number:	319000-00420-B1203-0150-0003-0155
Document Category:	Information

Stamp

Comment given in this document does not relieve vendor of his/her responsibility for the correct engineering design and fabrication. This equipment or product shall be made as per the codes, requisition, specification, project procedures, and international standards.

Rev	Date DD-MMM-YYYY	Written By (name)	Check By (name)	Approved By (name)	Status
0B	23-12-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	
OA	25-SEP-2008	P.AYYAKKANNU	T.KALIRAMAKRISHNAN	V.DHANDAYUTHAM	

1.0 APPLICABLE STANDARDS :

a) ANSI / ISA 75.01 for control valve sizing equations.

b) ANSI / ISA 75.02 for control valve capacity test procedure.

c) ANSI FCI 70-2 for seat leakage

d) ANSI B 16.10 for Face to Face dimensions.

e) ANSI B 16.5 for Flange dimensions and drilling.

2.0 TECHNICAL REQUIREMENTS:

a) For flow parameters and requirement of accessories, refer to Item Description and/or the data sheet.

b) Carbon steel globe body (ASTM A216 WCB / ASTM A105) flanged as per ANSI to the specified rating.

c) Top & bottom or Top & Port or Post guided plug.

d) Single seated SS trim; stellited as per requirements with =% or linear characteristics.

e) Soft seated for oil service to offer Class VI shut-off and metal seated for steam service to offer Class-V shut-off.

f) Compact design with short bonnet and over all height less than 450mm preferred.

f) Plain bonnet with packing to suit duty; provide special bonnets if duty warrants as per maker's standard.

g) Stem polished and finished to 2 - 4 microns RMS in case of Teflon Packing.

h) Valve internals shall not vibrate or chatter and not unduly noisy. The noise level shall be limited to 80 dBA, measured at 1 meter distance.

i) Valve closing time shall be less than 1 second when operted with solenoid valve.

j) Actuator signal port shall be directly tapped to 3/8" NPT(F) without any adopters.

3.0 ACCESSORIES:

a) Include required accessories in addition to accessories indicated in the data sheet.

b) Limit Switches shall be of approved make such as Honeywell, Microswitch, Square D, Cherry, or OMRAN, independent or cam operated rotary switches with 2 x DPDT contacts

to indicate OPEN/CLOSE ; 240 V AC 10 amp / 110 V DC 0.5 amp rating ; NEMA –4 oil tight & dust tight enclosure.

c)

d) Include Quick Exhaust valve, if required, to limit the valve closing time on large body valves

d) Quick Exhaust valve shall be mounted on to the actuator with 3/8" NPT(F) connection

e) All accessories shall be weather proof, water/oil tight to NEMA 4 & 13, suitable for outdoor installation and 70 Deg. ambient.

f) All accessories shall be supplied in fully mounted and piped up condition with 3/8" OD PVC jacketed copper tube.

All wiring shall be terminated to a local junction box provided with suitable enclosure as required. The junction box configuration shall be as per the enclosed sketch. The no. of openings shall be suitably decided by the vendor and no conduit port shall be extra which may be unused.

4.0 TEST CERTIFICATES:

Following Works Test Certificates shall be submitted along with the supplies;

a) Body hydraulic test done at 1·5 times the cold working pressure.

b) Seat leak test as per ANSI FCI 70-2, class VI.

c) Material certificate for body, bonnet and trim.

d) Standard tests on valve and actuator closing time.

e) For proper actuation of the limit switches.

f) Dimensional certificate for overall dimensions and all terminal connections.

g) Type test certificates shall be provided along with supplies for Cv rating of the valve as per ISA S75.02. The tested Cv shall not vary ± 5% of the rated Cv.

5.0 INWARD INSPECTION:

a) Verify the works test certificates, marking particulars, name plates of each accessory and the scope of supply.

b) Watch for damages.

c) Perform random check on all terminal connections and the internal particulars.

d) Third party inspection is applicable.

6.0 Marking:

6.1 Stainless steel name plate with following information boldly engraved , shall be firmly fixed to the body. Name plate shall be as per Document No. 319000-00000-SP-G349-0002Rev00.

6.2 Each spare shall be individually tagged with part name, maker's name, spare code & BHEL material code and/or as per the instructions provided along with the Purchase Enquiry.

7.0 Painting :

7.1 Painting shall be done in accordance with the Doc No. 319000-00420-A0106-015-0003-4101/0C.

8.0 Packing:

8.1 Packing and packing material shall be as per ISPM No.15.

And reference shall be made to Document No. 319000-00000-WI-GPCO-0001/04 for packing.

8.2 Liberal packing material & struts be used to arrest rolling and to prevent from transit damage.

9.0 Documents required with offer:

9.1 Refer Document No. 319000-00000-PP-GPES-0025 Rev02.

10.0 CE MARKING & PED REQUIREMENTS :

Equipment shall carry the CE mark to signify conformity to the European directives, as per the Council of the European Communities' Directive and particularly:

73/23/EEC and 93/68/EEC Low Voltage Equipment Directive and Amendment

89/336/EEC Electromagnetic Compatibility

94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres

1999/5/EC Radio and Telecommunications Terminal Equipment

97/23/EC Pressure Equipment Directive (PED)

98/37/EC Machine Safety

The Supplier is responsible for CE Marking and PED conformity.

11.0 O & M MANUAL:

Minimum of 2 sets of O&M manual in hard copy and 2 sets of soft copy shall be furnished within one month from the date of Purchase Order. ***Documents shall be furnished both in ENGLISH and FRENCH languages.***

11.0 Guarantee :

11.1 The equipment shall be guaranteed for replacement of any defective component.

11.2 The performance guarantee shall meet the project specification.

BHARAT HEAVY ELECTRICALS LIMITED
TRICHY -14

FBC & HRSG

ELECTRICALS, CONTROLS & INSTRUMENTATION

FBC&HRSG:CI:5312:TRIPVLV	REV 00	7 SHEETS

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

REV NO	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED
00	27.09.08	INITIAL ISSUE	NITIN	A SWAMINATHAN	S JAYAPRAKASH

NOTE:

1. In Vendor Compliance column' - vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'.

FILENAME: TRIPVLV .DOC

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YES/NO
1.0	SOLENOID VALVE		
1.1	Operating principle	Solenoid valves shall be 24VDC, with class F moulded coils, and shall be extremely low power (below 4 watt). DC solenoids shall have associated surge suppression diodes. Direct cable entry to solenoid coils shall be M20 with screwed terminals, unless control cable connection to the solenoid is via a junction box on a valve assembly. ON/OFF valves that are <40 mm diameter nominal (DN) for clear process fluid may be solenoid valve. operated. ON/OFF valves greater than 40DN shall be pneumatic cylinder actuator, solenoid operated. Solenoid valve shall be three-way, direct acting, "quick exhaust", normally closed or universal type, and stainless steel body and trim. Pneumatic connection of the valve shall be DN 6 (¼"). The solenoid valve shall be automatic reset and without manual override. To prevent high voltage induction, solenoid operating on direct current shall be provided with reverse diodes. Vent connections of solenoid valves shall be provided with an exhaust protector (bug screen). Exhaust vents shall be piped downwards to prevent ingress of water. Vent connections of solenoid valves shall be provided with an exhaust protector (bug screen). Exhaust vents shall be piped downwards to prevent ingress of water. The solenoid shall be pre-wired to the same junction box as the limit switches. The junction box shall be provided with two M20 cable entries, one for the limit switches and the second for the solenoid field cable connection. To prevent high voltage induction, solenoid	

		valves operating on direct current shall be provided with reverse diodes.	
1.2	Coil Operating voltage	24VDC	
1.3	Power Supply Variation	VOLTAGE: NIL FREQUENCY: NIL	
1.4	Pick up voltage	85% of rated voltage	
1.5	No. of ports (ways / position)	Refer Main Specification / To suit application	
1.6	Port size (all ports)	1/4" NPT(F)	
1.7	Action	Energise to open and de- energise to close.	
1.8	MATERIAL		
1.8.1	Body	Forged Brass.	
1.8.2	Internals	Elastomers - Buna - N / Viton	
		Springs - SS 316	
		Seat -Buna - N / Viton	
		Core / Plugnuts - SS 316	
		Insert - Acetal	
		Core tube - SS 316	
1.9	Coil Duty	Suitable for continuous energisation.	
1.10	Coil Insulation	Class - F. Epoxy moulded type with Polyphenylene sulphide bobbin.	
1.11	Coil enclosure	Stainless steel316	
1.12	Enclosure protection	IP - 65 ,to meet NEMA 4,Flame proof enclosure EEx(d) in accordance with the IEC 60079 and the ATEX 94/9/EC.	
1.13	MEDIUM		
1.13.1	Pressure range	0-7.5 Kg/ sq.cm(g) – Compressed air.	
1.13.2	Temperature range	0 TO 50°C	
1.14	Mounting	Integral.	
1.15	Manual operator	Yes	
1.16	Cable connection	1/2" NPT(F)	
1.17	Ambient temperature	85°C max	
1.18	Accessories required	i) Mounting brackets, nuts & bolts –Nickel/chromium plated. ii) Coils are to be terminated in integral T.B. **Flying leads are not acceptable.**	
1.19	Seat Leakage	Bubble tight *or* permitted leakage allowable.	

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YESINO
1.20	Make		
2.0	AIR LOCK RELAY	AIR LOCK RELAY of automatic reset type to be provided. Lock-up valve (automatic reset type) shall be required in services requiring the control valve to remain in the position it had immediately prior to a complete failure of the instrument air supply, referred to as fail lock. The valve shall have a screwed bolt adjustment and shall be provided with a tamper proof locking facility. The valve shall be properly adjusted by the Supplier. It is preferred that the actuator action (direct/reverse) is field reversible, without the need of additional components and/or special tools.	
2.1	Stay-put Feature	On supply air failure, valve should remain stay-put.	
2.2	AIR LOCK ADJUSTMENT	AIR LOCK PRESSURE shall be field adjustable.	
2.3	Air filter Regulator set with Pressure gauge	Required. An air filter pressure regulator shall be supplied with the valve assembly, suitable to maintain the air pressure required to operate the control valve , while the air supply pressure varies between the specified minimum value and the design value. The regulator shall have a built-in pressure relief. if a booster is required for the control valve, it shall be provided with a separate air filter/regulator to prevent unstable operation due to air pressure fluctuations caused by the booster. The pressure regulator shall be provided with an integrally mounted output pressure gauge and a drain valve.	

		If the actuator are capable of withstanding the maximum instrument air pressure (which is 760 kPa), then a regulator is not mandatory; only a filter is required. Glass (bowl-type) filter regulators shall not be used. The body material of the pressure regulator shall be cast aluminium or steel.	
3.0	**LIMIT SWITCH**	Where required, limit switches shall be inductive3-WIRE 24 VDC proximity type, current sinking switch conforming to NAMUR/DIN 19234 Limit switches shall be adjustable and shall function independent from each other. Limit switches with flying leads shall be provided, by the Supplier, with a junction box for termination of the lead wires. The junction box shall be certified (if required), anti static design, made from reinforced polyester, or stainless steel, and provided with certified cable glands. The flying leads shall be protected by flexible conduit. The terminals shall be coloured blue if used with intrinsically safe limit switches. Otherwise, they shall be either grey or brown. One cable entry (size M20) shall be provided on the junction box for field cable connection to the limit switches.	
3.1	Duty	Heavy duty	
3.2	No. of Contacts	Each limit switch shall have 2 NO + 2 NC potential free contacts.	
3.3	Quantity Per Control Valve	1No limit switch for OPEN and 1No limit switch for CLOSE position.	
3.4	Enclosure	Weather proof to NEMA4.	
3.5	Mounting	Integral to valve & wired up to JB	
3.6	Operating Linkage	Required. Shall be fitted in the valve assembly.	
4.0	**JUNCTION BOX AND CABLE GLANDS**	Flame proof enclosure EEx(d) in accordance with the IEC 60079 and the ATEX 94/9/EC.	
4.1	Construction	HT DOCUMENT No:319000-00000-JSS-1570-0101 REV0A	

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YES/NO
5.0	**MISC**		
5.1	Interconnection tubing. All the accessories shall be duly tubed as per the enclosed Drg. 4-97-400-82924.	Manufacture, test and supply of copper tubing shall comply with the following specifications: ➢ Material shall be PVC jacketed copper conforming to ASTM B75 CL. C12200. ➢ Tubes shall be seamless; cold drawn and light annealed with plain ends. ➢ Seamless tubes shall have hardness of maximum HV 45 (a) (to be confirmed). Tubes shall be supplied in coil, lengths of the coil will be defined after supplier selection. Size-10mm OD Wall thickness-1.0mm **Max. allowable working press**-To be confirmed by supplier All tube fittings shall be compression twin ferruled type (front and back). Make shall be SWAGELOK or equal. All tube OD sizes shall be in METRIC All pipe threads shall be NPT to ASME B1.20.1	
5.2	Documents Required I. Along With Offer(in French and English)	i) Pneumatic Hook - up diagram ii) Junction box wiring diagram iii) Data Sheets for Solenoid Valve, limit switch & I/P Converter	
	II. After Order Placement(in French and English)	O&M for all instruments along with drawings, data sheets & test certificates in CD ROM. All documents shall be in French and english	
5.3	CE Marking	**CE Marking** Equipment shall carry the CE mark to signify conformity to the European	

		directives, as per the 'Council of the European Communities' Directive and particularly: 94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres 1999/5/EC Radio and Telecommunications Terminal Equipment 97/23/EC Pressure Equipment Directive (PED) 98/37/EC Machine Safety The Supplier is responsible for CE Marking conformity.	
5.4	**Special Requirements**	**IN THE EVENT OF INCONSISTENCY OR AMBIGUITY BETWEEN THE DOCUMENT NO 319000-00000-JSD-1550-0016 REV 02 & SPECIFICATION NO:FBC&HRSG:CI:5312:TRIPVLV;** DOCUMENT NO: **319000-00000-JSD-1550-0016 REV 02 WILL HAVE MORE PRIORITY.** APPLICABLE CODES AND STANDARDS FOR TRIPVALVE AND ACCESSORIES AS PER DOC.NO 319000-00000-JSD-1500-0009 REV 05 CLAUSE 2.3 (PAGE 08 OF 43 TO 10 OF 43) & DOC.NO 319000-00000-JSD-1500-0008 REV 05 CLAUSE 4.2,4.3 & 4.4 (PAGE 12 OF 65 TO 16 OF 65) AND PACKING PROCEDURE AS PER DOC NO.319000-00000-WI-GPCO-0001	

NOTE:

@ - Vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE' in vendor confirmation column.

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)

Motors shall conform to French Standards. High efficiency energy saving motors are required. All bolts and screws shall be corrosion resistant stainless steel. Only stainless steel shall be used for dust shields or shims etc.
Motors shall be suitable for exposed outdoor use to 40C ambient in a tropical environment that may be dusty, wet, corrosive and subject to spillage of nickel ore, rock, salt water spray, coal or corrosive fluids.
Motors shall preferably be 4-pole foot mounted. However motors of up to 8 poles may be used for Economic or maintenance reasons. Preferred direction of rotation is clockwise from the drive end.
Preferred location of the rotatable terminal box is RHS viewed from the drive end or else top mounted.
All motors shall be provided with stainless plates (in addition to the standard nameplate) engraved with the motor number. These plates shall be attached with stainless steel wire so that the plates can be transferred to replacement motors.
All motors shall be able to start and accelerate connected loads when the voltage at the point of load is 80% of the nominal voltage.

LV Motors

These shall be rated up to 355kW and up to 1000kW if equipped with VSD unit unless otherwise specified and shall be provided with the following features:

- Conform to the relevant standard including frame sizes.
- Cast iron frame, fan cooled.
- Squirrel cage motor, duty type S1 (continuous).
- 690V +10% -6% (steady state), -10% during the starting period of other motor, 3 phase 50 Hz with Variations as noted in clause 'frequency Variation".

The system frequency variations are as follows:

- Steady State 50 Hz ±2%. (1Hz)
- Short term (1 minute) limit 50 Hz ±4%.
- Brief emergency excursion limit (10 seconds) to 54Hz following a major load rejection or 47Hz following a major load application.
- Enclosed frame, IP55, TEFC.
- Stainless steel dust shield wrapped around motor body between mounting feet (option).
- Bi-directional cooling fan - low noise.
- Noise level below 80 dBA at 1m.
- Motor terminal box IP55, with removable nonmagnetic gland plate or cable entry, RHS viewed from drive end or on top.
- Earth stud in terminal box plus external frame earth stud beneath terminal box.
- Motor terminal box oversized to accommodate specific 3C+E cables or large single core cables per cable schedule.
- Winding insulation Class F, with Class B temperature rise as a minimum.
- Method of cooling IC411.
- Rated for 6 starts per hour as a minimum.
- Grease pressure relief anti friction bearings.
- Bearings chosen to suit load type.
- Bearing lubrication system required.
- Bearing current protection fitted (e.g. shaft earth or bearing insulation).
- 230 V AC heaters fitted 55kW and above (VSDs only).
- Thermistors fitted 55kW and above (VSDs only).

ANNEXURE-2 – ECI (SPECIFICATION FOR LV MOTORS)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG: CI: 5312:LVM2
Rev:00 (2-Sheets)
PAGE02 OF02

□ Separate junction boxes for power, heaters, and temperature sensors. □ Two pack epoxy paint colored as per section 11, Painting and Identification.
□ Tropic proofed.
□ Rationalized motor sizes to reduce spares.
□ Suitable for use with variable speed controllers or separately driven fan fitted.
□ Motors above 0.75kW to be 3 phase.
□ All bearing housings on motors with reasonable bearing shock pulse movement shall be equipped with SPM transducer adaptors in an accessible position clear of the motor body to suit a bearing condition analyser. Axial, vertical and horizontal SMP studs shall be fitted at DE and NDE.
□ Shipped bolted to a skid frame, wrapped in several layers of heavy duty plastic with shaft clamps fitted and all entries sealed by threaded plugs. Shaft keys shall be taped to the motor shaft.
□ Parallel type drive shafts shall be provided unless required otherwise by the drive application.
□ The sizes of single speed general-purpose three phase motors shall be rationalised in accordance with Cenelec HD 231.

Motor Numbering

In addition to the standard nameplate, all motors shall be provided with a blank 316 stainless steel plates for HT to add their motor number.

Variable Speed Drive Motors

Motors for variable speed drive applications shall be specifically chosen based on the duty and speed range provided on the motor data sheet.
Specific additional requirements for VSD motors are as follows:
□ Class H insulation with class B temperature rise preferred.
□ Bearing current protection fitted (e.g. shaft earth or bearing insulation).
□ Noise within specified limits over speed range specified.
□ Motor temperature sensors fitted (thermistors or RTD) for motors rated 55kW and above.
□ 230V AC heaters fitted for motors rated 55kW and above
□ Separately driven fan or larger frame size motor supplied if standard motor cannot meet service conditions (load and duty over speed range).

	Name	Signature	Date
Prepared	Nitin Menon		26.04.2008
Checked	A.Swaminathan		26.04.2008
Approved	R.J.Narayanan		26.04.2008

BHARAT HEAVY ELECTRICALS LIMITED
TRICHY -14

FBC & HRSG

ELECTRICALS, CONTROLS & INSTRUMENTATION

FBC&HRSG:CI:5312:TRIPVLV	REV 00	7 SHEETS

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

REV NO	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED
00	27.09.08	INITIAL ISSUE	NITIN	A SWAMINATHAN	S JAYAPRAKASH

NOTE:

1. In Vendor Compliance column' - vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'.

FILENAME: TRIPVLV .DOC

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YES/NO
1.0	SOLENOID VALVE		
1.1	Operating principle	Solenoid valves shall be 24VDC, with class F moulded coils, and shall be extremely low power (below 4 watt). DC solenoids shall have associated surge suppression diodes. Direct cable entry to solenoid coils shall be M20 with screwed terminals, unless control cable connection to the solenoid is via a junction box on a valve assembly. ON/OFF valves that are <40 mm diameter nominal (DN) for clear process fluid may be solenoid valve. operated. ON/OFF valves greater than 40DN shall be pneumatic cylinder actuator, solenoid operated. Solenoid valve shall be three-way, direct acting, "quick exhaust", normally closed or universal type, and stainless steel body and trim. Pneumatic connection of the valve shall be DN 6 (¼"). The solenoid valve shall be automatic reset and without manual override. To prevent high voltage induction, solenoid operating on direct current shall be provided with reverse diodes. Vent connections of solenoid valves shall be provided with an exhaust protector (bug screen). Exhaust vents shall be piped downwards to prevent ingress of water. Vent connections of solenoid valves shall be provided with an exhaust protector (bug screen). Exhaust vents shall be piped downwards to prevent ingress of water. The solenoid shall be pre-wired to the same junction box as the limit switches. The junction box shall be provided with two M20 cable entries, one for the limit switches and the second for the solenoid field cable connection. To prevent high voltage induction, solenoid	

		valves operating on direct current shall be provided with reverse diodes.	
1.2	Coil Operating voltage	24VDC	
1.3	Power Supply Variation	VOLTAGE: NIL FREQUENCY: NIL	
1.4	Pick up voltage	85% of rated voltage	
1.5	No. of ports (ways / position)	Refer Main Specification / To suit application	
1.6	Port size (all ports)	1/4" NPT(F)	
1.7	Action	Energise to open and de- energise to close.	
1.8	MATERIAL		
1.8.1	Body	Forged Brass.	
1.8.2	Internals	Elastomers - Buna - N / Viton	
		Springs - SS 316	
		Seat -Buna - N / Viton	
		Core / Plugnuts - SS 316	
		Insert - Acetal	
		Core tube - SS 316	
1.9	Coil Duty	Suitable for continuous energisation.	
1.10	Coil Insulation	Class - F. Epoxy moulded type with Polyphenylene sulphide bobbin.	
1.11	Coil enclosure	Stainless steel316	
1.12	Enclosure protection	IP - 65 ,to meet NEMA 4,Flame proof enclosure EEx(d) in accordance with the IEC 60079 and the ATEX 94/9/EC.	
1.13	MEDIUM		
1.13.1	Pressure range	0-7.5 Kg/ sq.cm(g) – Compressed air.	
1.13.2	Temperature range	0 TO 50°C	
1.14	Mounting	Integral.	
1.15	Manual operator	Yes	
1.16	Cable connection	1/2" NPT(F)	
1.17	Ambient temperature	85°C max	
1.18	Accessories required	i) Mounting brackets, nuts & bolts –Nickel/chromium plated. ii) Coils are to be terminated in integral T.B. **Flying leads are not acceptable.**	
1.19	Seat Leakage	Bubble tight *or* permitted leakage allowable.	

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YESINO
1.20	Make		
2.0	AIR LOCK RELAY	AIR LOCK RELAY of automatic reset type to be provided. Lock-up valve (automatic reset type) shall be required in services requiring the control valve to remain in the position it had immediately prior to a complete failure of the instrument air supply, referred to as fail lock. The valve shall have a screwed bolt adjustment and shall be provided with a tamper proof locking facility. The valve shall be properly adjusted by the Supplier. It is preferred that the actuator action (direct/reverse) is field reversible, without the need of additional components and/or special tools.	
2.1	Stay-put Feature	On supply air failure, valve should remain stay-put.	
2.2	AIR LOCK ADJUSTMENT	AIR LOCK PRESSURE shall be field adjustable.	
2.3	Air filter Regulator set with Pressure gauge	Required. An air filter pressure regulator shall be supplied with the valve assembly, suitable to maintain the air pressure required to operate the control valve , while the air supply pressure varies between the specified minimum value and the design value. The regulator shall have a built-in pressure relief. if a booster is required for the control valve, it shall be provided with a separate air filter/regulator to prevent unstable operation due to air pressure fluctuations caused by the booster. The pressure regulator shall be provided with an integrally mounted output pressure gauge and a drain valve.	

		If the actuator are capable of withstanding the maximum instrument air pressure (which is 760 kPa), then a regulator is not mandatory; only a filter is required. Glass (bowl-type) filter regulators shall not be used. The body material of the pressure regulator shall be cast aluminium or steel.	
3.0	**LIMIT SWITCH**	Where required, limit switches shall be inductive3-WIRE 24 VDC proximity type, current sinking switch conforming to NAMUR/DIN 19234 Limit switches shall be adjustable and shall function independent from each other. Limit switches with flying leads shall be provided, by the Supplier, with a junction box for termination of the lead wires. The junction box shall be certified (if required), anti static design, made from reinforced polyester, or stainless steel, and provided with certified cable glands. The flying leads shall be protected by flexible conduit. The terminals shall be coloured blue if used with intrinsically safe limit switches. Otherwise, they shall be either grey or brown. One cable entry (size M20) shall be provided on the junction box for field cable connection to the limit switches.	
3.1	Duty	Heavy duty	
3.2	No. of Contacts	Each limit switch shall have 2 NO + 2 NC potential free contacts.	
3.3	Quantity Per Control Valve	1No limit switch for OPEN and 1No limit switch for CLOSE position.	
3.4	Enclosure	Weather proof to NEMA4.	
3.5	Mounting	Integral to valve & wired up to JB	
3.6	Operating Linkage	Required. Shall be fitted in the valve assembly.	
4.0	**JUNCTION BOX AND CABLE GLANDS**	Flame proof enclosure EEx(d) in accordance with the IEC 60079 and the ATEX 94/9/EC.	
4.1	Construction	HT DOCUMENT No:319000-00000-JSS-1570-0101 REV0A	

SPECIFICATION FOR OPEN/CLOSE VALVE ACCESSORIES

SL. NO	SPECIFICATION	BHEL REQT.	@VENDOR CONFIRMATION YES/NO
5.0	**MISC**		
5.1	Interconnection tubing. All the accessories shall be duly tubed as per the enclosed Drg. 4-97-400-82924.	Manufacture, test and supply of copper tubing shall comply with the following specifications: ➢ Material shall be PVC jacketed copper conforming to ASTM B75 CL. C12200. ➢ Tubes shall be seamless; cold drawn and light annealed with plain ends. ➢ Seamless tubes shall have hardness of maximum HV 45 (a) (to be confirmed). Tubes shall be supplied in coil, lengths of the coil will be defined after supplier selection. Size-10mm OD Wall thickness-1.0mm **Max. allowable working press**-To be confirmed by supplier All tube fittings shall be compression twin ferruled type (front and back). Make shall be SWAGELOK or equal. All tube OD sizes shall be in METRIC All pipe threads shall be NPT to ASME B1.20.1	
5.2	Documents Required I. Along With Offer(in French and English)	i) Pneumatic Hook - up diagram ii) Junction box wiring diagram iii) Data Sheets for Solenoid Valve, limit switch & I/P Converter	
	II. After Order Placement(in French and English)	O&M for all instruments along with drawings, data sheets & test certificates in CD ROM. All documents shall be in French and english	
5.3	CE Marking	**CE Marking** Equipment shall carry the CE mark to signify conformity to the European	

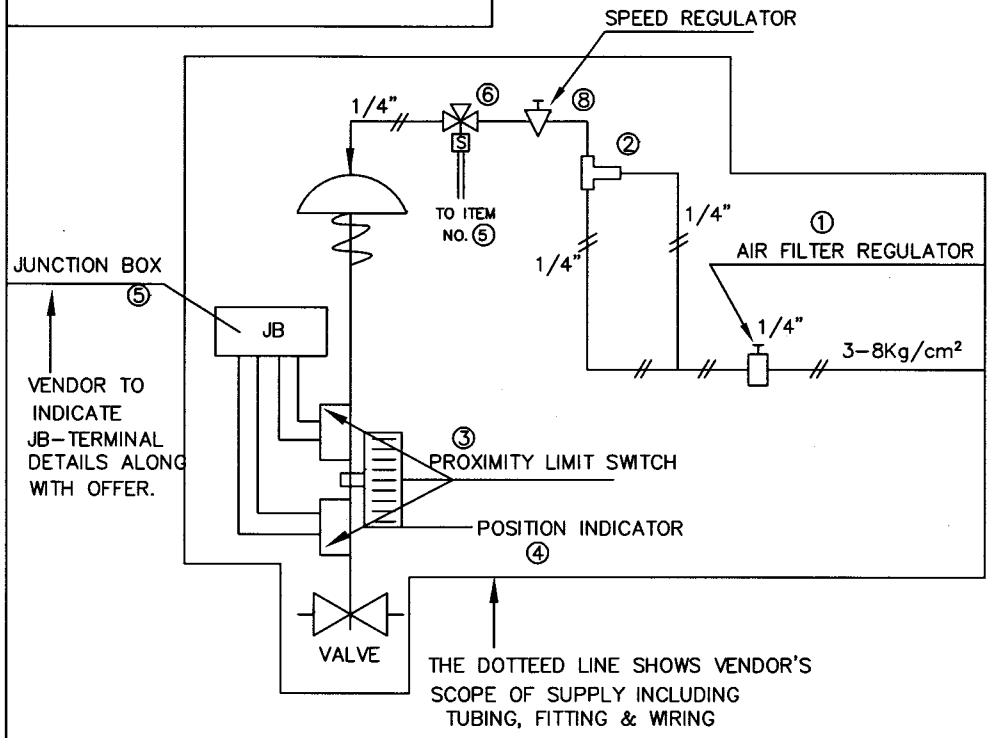
		directives, as per the 'Council of the European Communities' Directive and particularly: 94/9/EC Equipment and Protective Systems in Potentially Explosive Atmospheres 1999/5/EC Radio and Telecommunications Terminal Equipment 97/23/EC Pressure Equipment Directive (PED) 98/37/EC Machine Safety The Supplier is responsible for CE Marking conformity.	
5.4	**Special Requirements**	**IN THE EVENT OF INCONSISTENCY OR AMBIGUITY BETWEEN THE DOCUMENT NO 319000-00000-JSD-1550-0016 REV 02 & SPECIFICATION NO:FBC&HRSG:CI:5312:TRIPVLV;** DOCUMENT NO: **319000-00000-JSD-1550-0016 REV 02 WILL HAVE MORE PRIORITY.** APPLICABLE CODES AND STANDARDS FOR TRIPVALVE AND ACCESSORIES AS PER DOC.NO 319000-00000-JSD-1500-0009 REV 05 CLAUSE 2.3 (PAGE 08 OF 43 TO 10 OF 43) & DOC.NO 319000-00000-JSD-1500-0008 REV 05 CLAUSE 4.2,4.3 & 4.4 (PAGE 12 OF 65 TO 16 OF 65) AND PACKING PROCEDURE AS PER DOC NO.319000-00000-WI-GPCO-0001	

NOTE:

@ - Vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE' in vendor confirmation column.

REV	DATE	ALTERED :
00		CHECKED :

OPEN/CLOSE VALVE - ACCESSORIES/SCOPE



NO	DESCRIPTION	QUANTITY/ VALAVE	VENDOR CONFIRMATION YES/NO *
1	AIR FILTER (25 MICRON) CUM REGULATOR SET WITH PRESSURE GAUGES (Inlet and Outlet). AND A BUILT IN FILTER-HOUSING BLOW DOWN VALVE.	1 NO	
2	AIR LOCK-UP VALVE (STAY PUT DEVICE)	1 NO	
3	LIMIT SWITCH - HEAVY DUTY 2 NO + 2 NC CONTACTS WITH CONTACT RATING 5 AMP AT 240V AC (INDUCTIVE)	2 NOs (ONE FOR OPEN ONE FOR CLOSE)	
4	MECHANICAL LOCAL POSITION INDICATOR	1 NO	
5	JUNCTION BOX WITH NICKEL PLATED BRASS DOUBLE COMPRESSION CABLE GLANDS (6NOS.). SS PLUGS (2NOS) IS REQUIRED IF JB IS FLAMEPROOF.	1 NO	
6	SOLENOID VALVE	1 NO	
7	TUBING & FITTINGS AND WIRING	1 SET	
8	SPEED REGULATOR	1 NO	

* VENDOR TO FILL IN CONFIRMATION COLUMN WHILE OFFERING

	NAME	SIGNATURE	DATE
DRN	SR		
CHD	NM		
APPD	AS		

FILE NAME 5204BVLV.DWG

FLOPPY NO

361 401

DEPT	CODE
ELEC, C & I	3611

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT
TIRUCHIRAPPALLI - 620014

CUST.NO 5312,5313

TITLE *OPEN/CLOSE VALVE - ACCESSORIES / SCOPE*

PROJECT *KONIAMBO NICKEL*

CUSTOMER:
CONSULTANT:

SHEET NO

DRAWING NO: 4-97-400-82924

REV 00

KONAMBO NICKEL PROJECT (CUST No. 5312, 5313)

DIESEL FIRING SYSTEM

FBC&HRSG:FF:5312:LEG/0A

PARAMETERS

P	=	PRESSURE
T	=	TEMPERATURE
F	=	FLOW
DP	=	DIFFERENTIAL PRESSURE

SYMBOLS

INSTRUMENT LINE

ELECTRICAL SIGNAL

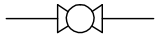
PNEUMATIC SIGNAL

MAJOR PROCESS LINE

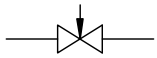
SECONDARY PROCESS LINE


OPEN GATE VALVE


CLOSED GATE VALVE

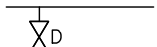

OPEN BALL VALVE

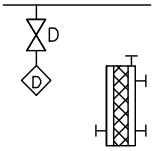

CHECK VALVE


OPEN REGULATING VALVE

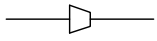

THREE WAY VALVE

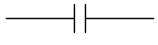
VENT TO ATMOSPHERE

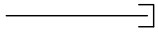

DRAIN TO COLLECTION NETWORK

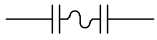


STRAINER

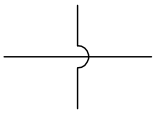

CONCENTRIC REDUCER

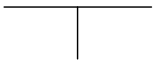

FLANGED CONNECTION


BLIND FLANGE


FLEXIBLE HOSE

FLOW DIRECTION


LINE CROSSING (NOT CONNECTED)


LINE CONNECTED

PRESSURE INDICATOR

PRESSURE TRANSMITTER


TIE IN TAG


FLOW METER

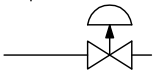
ELECTRIC MOTOR


DIAPHRAGM


DIAPHRAGM WITH POSITIONER

SOLENOID


MANUAL OPERATED

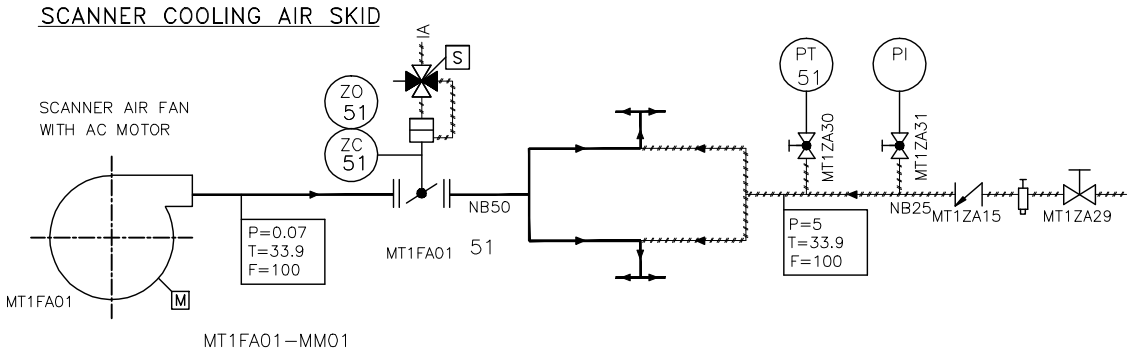

FAIL OPEN

KONAMBO NICKEL PROJECT – BOILER #2 (CUST No. 5313)

DIESEL FIRING SYSTEM

SCANNER COOLING AIR SKID

PID No. FBC&HRSG:FF:5312:SAF/0A



NOTES:

01. PI & PT ARE NOT IN SUPPLIER'S SCOPE. SUPPLIER TO TERMINATE AT THE OUTLET OF INSTRUMENT ROOT VALVES.

02. TAG Nos PROVIDED DURING DRAWING APPROVAL SHALL BE FINAL.